

WHAT IS CLAIMED IS:

- 1           1. A method for adaptively filtering a signal,  
2 comprising the steps of:  
3           receiving a signal;  
4           processing the signal to produce a first processed  
5 signal, the first processed signal including a desired  
6 portion and an adjacent portion;  
7           removing a direct current (DC) offset of the first  
8 processed signal to produce a second processed signal;  
9           determining filter coefficients based on relative  
10 signal strengths of the desired portion and the adjacent  
11 portion; and  
12           low pass filtering the second processed signal  
13 utilizing the filter coefficients to produce a third  
14 processed signal.

1           2.    The method according to Claim 1, wherein said step  
2   of processing the signal to produce a first processed signal  
3   comprises the steps of:

4                splitting the signal into an in-phase (I) channel  
5   component and a quadrature-phase (Q) channel component;

6                low pass filtering each of the I channel component  
7   and the Q channel component; and

8                decimating each of the I channel component and the  
9   Q channel component.

1           3.    The method according to Claim 1, wherein said step  
2   of removing a direct current (DC) offset of the first  
3   processed signal to produce a second processed signal  
4   comprises the steps of:

5                storing the first processed signal to produce a  
6   stored first processed signal;

7                determining a DC level value of the first processed  
8   signal; and

9                subtracting the DC level value from the stored  
10   first processed signal to produce the second processed  
11   signal.

1           4.    The method according to Claim 1, further comprising  
2    the steps of:  
3            decimating the third processed signal to produce a  
4    fourth processed signal; and  
5            forwarding the fourth processed signal for further  
6    processing.

1           5.    The method according to Claim 1, wherein said step  
2   of determining filter coefficients based on relative signal  
3   strengths of the desired portion and the adjacent portion  
4   comprises the steps of:

5                high pass filtering the first processed signal to  
6   substantially extract the adjacent portion;

7                calculating the power of the adjacent portion;

8                calculating the power of the first processed  
9   signal;

10              determining a power ratio responsive to the power  
11   of the adjacent portion and the power of the first processed  
12   signal;

13              determining a bandwidth for an adjacent channel  
14   filter based on the power ratio; and

15              determining filter coefficients for the adjacent  
16   channel filter responsive to the bandwidth of the adjacent  
17   channel filter.

1           6.    The method according to Claim 1, wherein said step  
2   of determining is performed at least once per burst in a time  
3   division multiple access (TDMA) scheme.

1           7.     A method for adaptively filtering a signal,  
2     comprising the steps of:  
3                 receiving a signal, the signal including a desired  
4     portion and an adjacent portion;  
5                 high pass filtering the signal to produce an  
6     adjacent channel signal;  
7                 calculating the power of the adjacent channel  
8     signal;  
9                 calculating the power of the signal;  
10                determining a power ratio responsive to the power  
11     of the adjacent channel signal and the power of the signal;  
12                determining a bandwidth for a channel filter based  
13     on the power ratio; and  
14                low pass filtering the signal or a derivative of  
15     the signal using the channel filter configured responsive to  
16     the bandwidth.

1           8.    The method according to Claim 7, wherein said steps  
2   of calculating the power of the adjacent channel signal and  
3   calculating the power of the signal are accomplished by  
4   estimating an amplitude of the adjacent channel signal and  
5   the signal, respectively, according to the following formula:

6                           
$$Amp = Max(I, Q) + 0.5 * Min(I, Q),$$

7   where "I" represents an in-phase (I) component and "Q"  
8   represents a quadrature-phase (Q) component for each  
9   amplitude for each of the adjacent channel signal and the  
10  signal, respectively.

1           9.    The method according to Claim 7, wherein said step  
2   of determining a power ratio responsive to the power of the  
3   adjacent channel signal and the power of the signal is  
4   accomplished according to the following formula:

5                           
$$power\ ratio = \frac{power\ of\ the\ signal - power\ of\ the\ adjacent\ channel\ signal}{power\ of\ the\ adjacent\ channel\ signal}$$

1           10. The method according to Claim 7, wherein said step  
2 of determining a bandwidth for a channel filter based on the  
3 power ratio comprises the steps of:

4                 comparing the power ratio to a list of power  
5 ratios;

6                 selecting a selected power ratio from the list of  
7 power ratios that is closest to the power ratio; and

8                 determining the bandwidth that corresponds to the  
9 selected power ratio in the list of power ratios.

1           11. The method according to Claim 7, wherein said step  
2 of low pass filtering the signal or a derivative of the  
3 signal using the channel filter configured responsive to the  
4 bandwidth comprises the steps of:

5                 ascertaining a set of filter coefficients that  
6 provide a filtering bandwidth substantially equivalent to the  
7 bandwidth; and

8                 applying the set of filter coefficients to a low  
9 pass filter.

1           12. The method according to Claim 7, wherein the method  
2    is performed at least once per burst in a time division  
3    multiple access (TDMA) scheme.

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1           13. An apparatus for adaptively filtering a signal,  
2     comprising:  
3           at least one analog-to-digital (A/D) converter,  
4     said at least one A/D converter receiving an analog signal  
5     and outputting a digital signal, the digital signal including  
6     a desired portion and an adjacent portion;  
7           a direct current (DC) offset part, said DC offset  
8     part adapted for receiving the digital signal or a derivative  
9     thereof and compensating for a DC offset to produce a  
10    compensated signal;  
11          a filter coefficient determiner, said filter  
12    coefficient determiner adapted for receiving the digital  
13    signal or the derivative thereof and producing as output a  
14    filter control signal based on relative signal strengths of  
15    the desired portion and the adjacent portion; and  
16          at least one filter, said at least one filter  
17    receiving the filter control signal and being controlled  
18    thereby, said at least one filter adapted for filtering the  
19    compensated signal and producing a filtered output signal  
20    responsive to the filter control signal.

7                   at least one decimator, said at least one decimator  
8    receiving the first derivative digital signal and decimating  
9    the first derivative digital signal to reduce the number of  
10   digital samples and produce a second derivative digital  
11   signal.

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1           16. The apparatus according to Claim 14, wherein the  
2           second derivative digital signal is further low-pass filtered  
3           and decimated before comprising the derivative of the digital  
4           signal that is received by said DC offset part and said  
5           filter coefficient determiner.

1           17. The apparatus according to Claim 13, wherein said  
2           DC offset part comprises:

3                 a DC-level determiner, the DC-level determiner  
4           adapted for receiving the digital signal or the derivative  
5           thereof as input and for producing as output a DC-level value  
6           associated with the digital signal or the derivative thereof,  
7           respectively;

8                 a memory, the memory adapted for receiving and  
9           storing the digital signal or the derivative thereof; and

10                at least one subtractor, the at least one  
11           subtractor adapted for determining the difference between the  
12           digital signal or the derivative thereof and the DC-level  
13           value.

1           18. The apparatus according to Claim 13, further  
2     comprising:  
3           at least one decimator, said at least one decimator  
4     adapted for receiving the filtered output signal and  
5     decimating the filtered output signal to reduce the number  
6     of digital samples and produce a desired signal that is  
7     forwarded for further processing.

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1           19. The apparatus according to Claim 13, wherein said  
2 filter coefficient determiner comprises:  
3           at least one high pass filter, said at least one  
4 high pass filter adapted for receiving the digital signal or  
5 the derivative thereof and high pass filtering the signal to  
6 produce an adjacent channel signal;  
7           a first power calculator, said first power  
8 calculator adapted for receiving the adjacent channel signal  
9 and calculating the power of the adjacent channel signal;  
10          a second power calculator, said second power  
11 calculator adapted for receiving the digital signal or the  
12 derivative thereof and calculating the power of the signal;  
13 and  
14          a filter coefficient selector, said filter  
15 coefficient selector determining a power ratio responsive to  
16 the power of the adjacent channel signal and the power of the  
17 signal, said filter coefficient selector adapted for  
18 determining a bandwidth for a channel filter based on the  
19 power ratio and for ascertaining a plurality of filter  
20 coefficients based on the bandwidth, the filter control  
21 signal comprising the plurality of filter coefficients.

21. The apparatus according to Claim 13, wherein the apparatus comprises a mobile terminal operating substantially in accordance with the Global System for Mobile Communications ++ (GSM++) standard.

1        22. The apparatus according to Claim 13, wherein the  
2        apparatus comprises a base station operating substantially  
3        in accordance with the Global System for Mobile  
4        Communications ++ (GSM++) standard.

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1           25. An arrangement for adaptively filtering a signal,  
2 comprising:

3                   at least one high pass filter, said at least one  
4 high pass filter adapted for receiving a signal and high pass  
5 filtering the signal to produce an adjacent channel signal,  
6 the signal including a desired portion and an adjacent  
7 portion;

8                   a first power calculator, said first power  
9 calculator adapted for receiving the adjacent channel signal  
10 and calculating the power of the adjacent channel signal;

11                  a second power calculator, said second power  
12 calculator adapted for receiving the signal and calculating  
13 the power of the signal; and

14                  a filter coefficient selector, said filter  
15 coefficient selector determining a power ratio responsive to  
16 the power of the adjacent channel signal and the power of the  
17 signal, said filter coefficient selector adapted for  
18 determining a bandwidth for a channel filter based on the  
19 power ratio and for ascertaining a plurality of filter  
20 coefficients based on the bandwidth.



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1           28. The arrangement according to Claim 25, further  
2 comprising:

3                 a memory, said memory storing a plurality of power  
4 ratio values in a look up table, each power ratio value of  
5 said plurality of power ratio values associated in said  
6 memory with a corresponding bandwidth; and

7                 wherein said filter coefficient selector is further  
8 adapted for accessing said memory to determine a selected  
9 power ratio that is closest to the power ratio and for  
10 retrieving the corresponding bandwidth that is associated  
11 with the selected power ratio.

7                wherein said filter coefficient selector is further  
8    adapted for accessing said memory to determine a selected  
9    bandwidth that is closest to the bandwidth and for retrieving  
10   the corresponding set of filter coefficients that is  
11   associated with the selected bandwidth.

6            wherein said filter coefficient selector is further  
7   adapted for providing said plurality of filter coefficients  
8   to said adjacent channel filter.

1           31. The arrangement according to Claim 25, wherein the  
2     arrangement comprises at least part of a homodyne-based  
3     receiver.

1           32. The arrangement according to Claim 25, wherein said  
2     at least one high pass filter, said first power calculator,  
3     said second power calculator, and said filter coefficient  
4     selector are comprised, at least partially, of software.

1           33. The arrangement according to Claim 25, wherein the  
2     arrangement comprises at least part of a mobile terminal.

1           34. The arrangement according to Claim 25, wherein the  
2     arrangement comprises at least part of a base station.

1           35. A receiver for adaptively filtering a signal,  
2     comprising:  
3                 means for receiving a signal;  
4                 means for processing the signal to produce a first  
5     processed signal, the first processed signal including a  
6     desired portion and an adjacent portion;  
7                 means for removing a direct current (DC) offset of  
8     the first processed signal to produce a second processed  
9     signal;  
10                means for determining filter coefficients based on  
11     relative signal strengths of the desired portion and the  
12     adjacent portion; and  
13                means for low pass filtering the second processed  
14     signal utilizing the filter coefficients to produce a third  
15     processed signal.

1           36. An arrangement for adaptively filtering a signal,  
2     comprising:  
3                 means for receiving a signal, the signal including  
4     a desired portion and an adjacent portion;  
5                 means for filtering the signal to produce an  
6     adjacent channel signal;  
7                 means for calculating the power of the adjacent  
8     channel signal and for calculating the power of the signal;  
9                 means for determining a power ratio responsive to  
10    the power of the adjacent channel signal and the power of the  
11    signal;  
12                means for determining a bandwidth for a channel  
13    filter based on the determined power ratio;  
14                means for configuring the channel filter responsive  
15    to the determined bandwidth; and  
16                means for channel filtering the signal or a  
17    derivative of the signal using the configured channel filter.

1           37. An apparatus for rejecting an adjacent channel,  
2     comprising:  
3           an adjacent channel filter, said adjacent channel  
4     filter receiving a control signal input, said adjacent  
5     channel filter configured to reject an adjacent channel and  
6     to pass a desired channel responsive to the control signal  
7     input; and  
8           a control signal determiner, said control signal  
9     determiner receiving a signal that includes the adjacent  
10    channel and the desired channel, said control signal  
11    determiner configured to process the signal and to produce  
12    the control signal input, the control signal input based on  
13    relative power levels of the adjacent channel and the desired  
14    channel.